Operation Manual

Model “C & CHD” Tubing Spider

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SAFETY

READ THIS MANUAL BEFORE USING EQUIPMENT

Equipment supplied by Texas International Oilfield Tools is intended for installation and use in controlled environments involving hazardous operations and situations.

Only authorized and trained personnel shall install, maintain, operate and/or repair equipment supplied by Texas International Oilfield Tools, LTD. Equipment shall be used only for the purpose for which it is intended.

The User is responsible for ensuring the equipment is in safe working order prior to use. Texas International Oilfield Tools, LTD is not responsible for injuries or equipment damage that arises from equipment neglect or misuse.

The User is responsible for ensuring the safety of all personnel within the vicinity of the equipment. Texas International Oilfield Tools recommends a hazard assessment be performed by qualified safety representatives prior to using equipment. All personnel shall possess and use Personal Protective Equipment (PPE) and must be trained at minimum on rig safety, rig procedures, and equipment operation.

Hazard Labels Used in this Manual

DANGER is represented by this hazard symbol and signifies the highest level of risk. Failure to observe and heed this information may result in serious bodily injury or death.

WARNING is represented by this hazard symbol and signifies potential hazards of medium risk. Failure to observe and heed this information may result in significant bodily injury, catastrophic equipment failure, and/or environmental contamination.

CAUTION is represented by this hazard symbol and signifies potential hazards of low risk. Failure to observe and heed this information may result in bodily injury and/or equipment damage.

NOTICE symbol denotes items of importance unrelated to personal injury which highlight additional information provided to aid the user during installation, commissioning, operating, and/or maintaining equipment.

Notes, cautions, warnings, explanations, and information are provided herein to advise readers to take deliberate action to protect personnel from potential injury or lethal conditions. Please pay close attention to these advisories.

SPECIFICATIONS

SPECIFICATIONS	MODEL "B"	MODEL "C"	MODEL "CHD"	MODEL "F"	MODEL "G"
MATERIAL	Alloy Steel	Alloy Steel	Alloy Steel	Alloy Steel	Alloy Steel
WEIGHT – LESS SLIPS	210 LBS 95 KGS	328 LBS 149 KGS	365 LBS 165 KGS	1175 LBS 532 KGS	2900 LBS 1315 KGS
OVERALL HEIGHT	15-1/2 IN 39 CM	16-1/2 IN 42 CM	16-1/2 IN 42 CM	28 IN/71 CM A) 17 IN/43 CM to top of bowl w/o guard. B) 22-1/2 IN/57 CM To highest pt w/o guard.	35 IN/89 CM A) 17 IN/43 CM to top of bowl w/o guard. B) 22-1/2 IN/57 CM To highest pt w/o guard
BASE DIMENSIONS	16 X 19-1/2 IN 41 X 50 CM	18-1/2 X 18-1/2 IN 47 X 47 CM	20 X 19 IN 51 X 48 CM	28 X 28 IN 71 X 71 CM	41 X 41-5/8 IN 104 X 106 CM
BOLT CENTERS	11-1/8 – 16-1/2 IN 28 – 42 CM	12-3/4 – 14-1/2 IN 32 – 37 CM	12-3/4 – 14-1/2 IN 32 – 37 CM	18-3/4 – 24-1/2 IN 48 – 62 CM	31 – 37 IN 78 – 94 CM
GATE OPENING	4-1/4 IN 10.8 CM	5-3/4 IN 14.60 CM	5-3/4 IN 14.60 CM	8.75 IN 22.22 CM	13-3/4 IN 34.92 CM
BOWL OPENING	4-5/8 IN 11.75 CM	6-1/2 IN 16.50 CM	6-1/2 IN 16.50 CM	10-1/8 IN 25.72 CM	15-1/2 IN 39.37 CM
OPERATING AIR PRESSURE	35 – 45 PSI	40 – 50 PSI	40 – 50 PSI	60 – 80 PSI	150 PSI
OPERATING HYDRAULIC PRESSURE	250-275 PSI 1723 – 1896 KPA	250-275 PSI 1723 – 1896 KPA	250-275 PSI 1723 – 1896 KPA	275-300 PSI 1896 – 2068 KPA	300-350 PSI 2068 – 2413 KPA
TUBULAR GOODS RANGE	1.315 IN – 3-1/2 IN	1.315 IN – 5-1/2 IN	1.315 IN – 5-1/2 IN	2-3/8 IN – 8-5/8 IN	2-3/8 IN–13-3/8 IN
HOOK LOAD CAPACITY	110,000 LBS 49.89 TONNES	165,000 LBS 74.84 TONNES	250,000 LBS 113.40 TONNES	400,000 LBS 181.44 TONNES	700,000 LBS 317.52 TONNES

NOTES:

- To calculate maximum setting depth of string, divide the maximum load capacity by the weight per foot of the threaded and coupled tubular goods to be handled.

- For slips with Circular Button inserts and Strip inserts, reduce calculated setting depth by 40%.
- For slips with Chevron Inserts, reduce calculated setting depth by 25%.
- For slips with Integral teeth, no reduction of the calculated setting is necessary.
- For slips with Full circle inserts, no reduction of the calculated setting is necessary.
- For slips with Horizontal teeth inserts (applies to Model "F" Spider only), reduce calculated setting depth by 25% for drill pipe only.

SPIDER GENERAL INFORMATION

Description

The purpose of a tubing spider is to hold the load of the tubing string as it is lowered or raised from the well. The spider is made up of 3 principal assemblies: the base, the slip and the actuator.

The base of the spider contains a machined taper that matches the slip bodies. It also has all of the mounts for the linkages that operate the slips. Installed on the slips are the inserts. The size of insert and slip matches the tubing string. During operation, a control valve is used to actuate a cylinder that opens or closes the slips. This actuator can be hydraulic or pneumatic.

The only difference between a C and CHD spider is the base, which has an increased thickness to accommodate the increased design load.

Specifications

Load rating	
C	165000 lbs (74843 Kg)
CHD	250000 lbs (113398 Kg)
Size range	1.315 to 5-1/2" (33.4 to 139.7 mm)
Material	Heat treated alloy steel
Pressure requirements	
Hydraulic	300 to 500 PSI (20.7 to 34.5 bar)
Pneumatic	90 to 120 PSI (6.2 to 8.3 bar)
Weight	
C	408 lbs (185.1 Kg)
CHD	457 lbs (207.3 Kg)
Dimensions	
Gate opening	6" (152.4 mm)
Bowl opening	6-1/2" (165.1 mm)
Base	16-1/2" x 18-1/2" (419.1 mm x 469.9 mm)
Height	
C	17-1/2" (444.5 mm)
CHD	18" (457.2 mm)
Base bolt slot	
Slot width	1-1/2" (38.1 mm)
Slot centers	12-3/4 to 16-1/4" (323.9 to 412.8 mm)

INSTALLATION

Before any attempt is made to operate the tubing spider, the following section should be read, understood and then followed.

Control Valve

The tubing spider control valve is connected to the spider by a set of hoses. Always place this valve in a location that is easily accessed by the rig crew operator.

Hoses

Verify that the cylinder hoses do not present a trip hazard or interfere with any moving machinery. When connecting and disconnecting the hoses, ensure that there is no pressure on the lines.

Quick Disconnects

The hoses are fitted with quick disconnects. Before a connection is made, inspect the end faces of the quick disconnect. If any foreign material is present, then carefully remove the debris with a lint free rag or towel. Dust caps and plugs should be used with the quick disconnects to protect the ends and minimize contact with debris.

Inspection

Before moving the spider over the well, ensure the correct size slip assembly and inserts match the tube diameter.

After the lines are connected, cycle the cylinder and observe the linkage system to see if there are any functional problems. Disconnect the lines before moving the tubing spider.

Mount

The spider must be secured over the wellhead. The slotted holes in the base could be used to bolt the spider to an adapter plate. There are also eyes on the spider where it can be chained down.

OPERATION

Verify the following before and during operation of the spider.

- Keep the insert teeth clean from buildup of mud, grease, sand or other debris.
- Lubricate the bushings via the grease fittings found along the linkage assembly.

Depending on the operation of the control valve, pressure applied to the cylinder will either cause it to extend or retract. This cylinder moves the slip assembly via lift arms, crank shafts and links.

Opening the Slips

Retracting the cylinder prevents the insert teeth from engaging and supporting the tubing string by moving the slip up and out of the way.

Closing the Slips

To engage the insert teeth on the tubing string, the cylinder is extended. Then, the load of the tubing string can be held if it is lowered slightly thereby transferring the load from the hook to the spider.

Objects Larger than Spider Bore

When an object is coming in or out of the well that has a diameter larger than the bore of the spider, then the tubing spider has to be removed. Ensure the weight of the tubing string is not being held by the spider. Remove the gate so the spider can be removed from the string. Pass the object, and reinstall the tubing spider over the well. Install the gate back onto the spider and pin it in place.

Slip Assembly

The slip assembly must correlate with the size of tubing being held. The following instructions are for the replacement of the slip assembly or inserts. Refer to the warning section of the manual before working on the spider.

Slip Replacement

Follow the steps below. Refer to the parts drawing in this manual for a visual aid.

1. Use the pneumatic or hydraulic system to hold the slip bodies in the raised position.
2. Loosen and remove the nut from the bolt that secures the slip to the lift arm. Lift the slip assembly out of the spider. Repeat for the other side.
3. Replace with the new slip assemblies with inserts already installed. *Note: The slip assembly halves are a machined set and must always be kept together.* Align the bottom slip hole with the hole in the lift arm and secure using a new bolt and nut. Tighten the nut until the end of the bolt is flush with the end of the nut. Repeat for the other side. Do not over tighten as it is necessary for the slip to float relative to the lift arm.
4. Function test the slip to verify correct operation before usage.

INSERT REPLACEMENT

Use the following steps as a guide. Refer to the parts drawing in this manual for a visual aid.

1. Use the pneumatic or hydraulic system to hold the slip bodies in the raised position.
2. Remove the four cotter pins.
3. Using a 3/16" or 7/32" drift pin, remove the four retainer pins that are located in the hole formed between the slip body and slip insert.
4. Slide or drive the four slip inserts out of the slip body dove tail groove.
5. Clean the built up debris out of the slip body. Apply a new coating of grease to the slip body.
6. Install the new slip inserts by aligning the vertical groove in the insert with the slip body. *Note: Always replace inserts in a full set.*
7. Knock the retainer pins back into their corresponding holes.
8. Reinstall the four cotter pins or replace with new ones. Spread the legs of the pins to keep them from falling out.
9. Function test the slip to verify correct operation before usage.

TROUBLESHOOTING

The following table addresses possible solutions to problems that may occur during operation.

Table 1: Troubleshooting the Spider

Problem	Solution
Slip insert teeth are not gripping tubing	1) Clean the teeth. Verify they are clean from built up debris such as dirt, mud, grease, sand, etc. 2) Inspect the teeth for damage. Replace inserts if any of the teeth are worn, broken or chipped. 3) Verify the insert is not too loose in the slip body. If the insert can move vertically 1/10" or more, then it is too loose. Replace the slip body assembly. 4) Verify the correct size slip assembly and inserts are being used for the diameter of the tubing string.
Spider lift arms contact the spider body when the tubing is engaged	1) Inspect the bottom of the spider assembly. If the slip assembly extends past the bottom of the bowl, then replace the slip assembly. If the arms still contact the body, then inspect the bottom of the spider again. If the new slip extends below the bowl, then the spider base needs to be replaced.
Actuating cylinder does not function properly	1) Verify the pressure to the cylinder meets system requirements. 2) The seals could be worn inside the cylinder. Replace with new seals or replace the entire cylinder.
Linkage assembly loose or does not function properly	1) Inspect all bushings to see if they are worn and too loose on the pins. Replace with new bushings. 2) Inspect the crank shafts for wear. Replace if necessary. 3) Inspect the bolts at both end of the cylinder. Replace if there is any wear present.

SERVICE

It is important to maintain the spider in a condition that will provide continued safe operation. The following sections highlight items that need to be addressed over the life of the unit.

Daily

1. Grease all fittings on the tubing spider.
2. Inspect inserts for debris or wear.
3. Verify linkages operate properly.

Semi-annual Maintenance

1. Perform all activities listed in the daily section.
2. Perform a Nondestructive Evaluation (NDE) on all exposed critical areas of the slip bodies, spider base, gate and door pins.
3. Replace the crank and link bushings.
4. Rebuild the cylinder with new seals.
5. Function test the spider to verify proper operation.
6. Record the maintenance activities on a log or report that is kept on file and can be traced back to the serial number of the spider.

Annual Maintenance

1. Perform all activities listed in the daily section.
2. Completely disassemble the spider.
3. NDE all critical components such as slip assembly, lift arms, cranks, link, gate door pins and attachment points on the spider base. Replace any worn or damaged parts.
4. Replace the crank shafts.
5. Replace the crank and link bushings.
6. Replace the cylinder.
7. Inspect the fit between the door pins and the gate and body. Replace the pins if too loose.
8. Assemble the tubing spider with the good or replacement parts.
9. Function test the spider to verify proper operation.
10. Record the maintenance activities on a log or report that is kept on file and can be traced back to the serial number of the spider.

Instructions for replacing the crank shafts and bushings can be found in the following text.

Bushing Replacement

Use the following steps as a guide. Refer to the parts drawing in this manual for a visual aid.

1. Use the pneumatic or hydraulic system to hold the slip bodies in the raised position.
2. Remove the slip assemblies per the instructions found in the operation section.
3. Release the pressure on the cylinder allowing it to extend. Bleed any remaining pressure out of the cylinder.
4. Loosen and remove the nut on the bolt that pins the cylinder yoke to the link. Remove the bolt, and rotate the cylinder so that the yoke is away from the link.

5. The link is held onto the left and right hand crank shafts by two external retaining rings. Remove these rings so the link can be removed.
6. There are two bushings in the link. Using a press or bushing puller, remove these bushings from the link and discard. Install two new bushings into the link. Set the link aside.
7. Rotate the lift arms so the taper pins are exposed. These taper pins connect the lift arms to the crank shafts. Drive out the taper pins and set aside.
8. Loosen and remove the set screws that hold the lift arms to the crank shafts. Set the set screws aside.
9. Remove the crank shafts from the spider by lightly tapping the ends. Set these aside along with the lift arms and spacers.
10. Bushings are located in the spider body in four locations. Using a press or bushing puller, remove these bushings from the body and discard. Install four new bushings into the body.
11. Reassemble the tubing spider.
    a. Install the left hand crank shaft into the spider body. When inserting the shaft, put the spacer and lift arm back in their correct positions.
    b. Repeat for the right hand crank shaft.
    c. Install the link onto the left and right hand crank shafts. Hold the link arm onto the shafts by the two retaining rings.
    d. Move the link to the left. Rotate and shift the lift arm on the crank shaft until the holes for the taper pins are aligned. Drive the taper pins back through the lift arm and crank shaft. Install the set screw and tighten to hold these two parts in relation to each other.
    e. Repeat the above for the right hand crank shaft.
    f. Align the cylinder yoke with the hole in the link. Insert the bolt and tighten the nut until the nut edge is flush with the end of the bolt.
    g. Install the slip assemblies back onto the lifting arms.
    h. Function test the spider to verify proper operation.

Crank Shaft and Lift Arm Replacement

Use the following steps as a guide. Refer to the parts drawing in this manual for a visual aid. *Note: The following procedure can be difficult. If there are any doubts to the successful completion of the repair, then consult with an authorized repair facility.*

1. Replace the old cranks shafts and lift arms with new ones using the instructions in the bushing replacement section. Reassembly will stop when the taper pins are to be installed. The replacement crank shafts do not have holes drilled through them.
2. Ensure the crankshafts are slid into the spider body until they bottom out. This should position the back side of the link arm approximately 1/8" (3.2 mm) from the head of the safety latch bolt.
3. Position the lifting arms on the crank shaft so their midlines are centered with the bore of the spider body. Turn the lift arms in toward the spider body until they rest on top of the bowl.
4. Tighten the lift arm set screws to lock down their position relative to the crank shafts. Secure the position of the lift arms with tie downs so they may not move while being drilled.

5. Using the lift arm holes as a guide, center punch the crank shafts. Drill the four holes with an 11/32" drill bit. Ream the holes with a #7 tapered reamer.
6. Drive the taper pins back through the lift arm and crank shaft.
    a. Align the cylinder yoke with the hole in the link. Insert the bolt and tighten the nut until the nut edge is flush with the end of the bolt.
    b. Install the slip assemblies back onto the lifting arms.
    c. Function test the spider to verify proper operation.

One Year Spares

Below is a list of recommended spares for one year of operation.

Table 2: Pneumatic Tubing Spider One Year Spares

Part Number	Qty.	Parts Description
65107	1	Yoke
65116	4	Bolt (For Slips)
65122	4	Shaft Retaining Clip
65124	4	Crank Shaft Bushing
65125	2	Link Bushing
65136	2	Safety Bolt
65140K	2	Pneumatic Cylinder Repair Kit w/ O-rings and Internal Retainer Rings
65140	1	Pneumatic Cylinder
65601	12	Retainer Pin
992005-07	4	Hex Head Cap Screw
992005-09	4	Hex Head Cap Screw
992012-44	12	Cotter Pin
992073-01	12	Grease Fitting
992075-144	4	Lift Arm Set Screw
992089-09	8	Hex Nut
992089-13	4	Nut
992161-06	4	Lift Arm Taper Pin

Table 3: Hydraulic Tubing Spider One Year Spares

Part Number	Qty.	Parts Description
65107	1	Yoke
65116	4	Bolt (For Slips)
65122	4	Shaft Retaining Clip
65124	4	Crank Shaft Bushing
65125	2	Link Bushing
65136	2	Safety Bolt
65140H	1	Hydraulic Cylinder
65601	12	Retainer Pin
992005-07	4	Hex Head Cap Screw
992005-09	4	Hex Head Cap Screw
992012-44	12	Cotter Pin
992073-01	12	Grease Fitting
992075-144	4	Lift Arm Set Screw
992089-09	8	Hex Nut
992089-13	4	Nut
992161-06	4	Lift Arm Taper Pin

PARTS

Table 4: Spider Parts List

Item	Part Number	Qty.	Parts Description
1 & 2	65000-100	1	Model C Spider Assembly, Pneumatic
	65000HD-100	1	Model CHD Spider Assembly , Pneumatic
	65000H-100	1	Model C Spider Assembly, Hydraulic
	65000HDH-100	1	Model CHD Spider Assembly , Hydraulic
3	65103	1	Link (includes two 65125 Link Bushings and two 992073-4 Grease fittings)
4	65104	1	Left Hand Crank Shaft
5	65105	1	Right Hand Crank Shaft
6	65106	2	Lift Arm
7	65107	1	Yoke
8	65108	1	Safety Guard
	65108-100	1	Safety Guard with Visor
9	992073-4	2	Grease Fitting
10	992005-09	1	Hex Head Cap Screw
11	992005-07	1	Hex Head Cap Screw
12	992089-09	2	Hex Nut
13	992005-01	4	Hex Head Cap Screw
14	65114	2	Door Pin with Chain
15	992075-144	2	Lift Arm Set Screw
16	992161-06	4	Lift Arm Taper Pin
17	65122	2	Shaft Retaining Clip
18	992073-01	4	Grease Fitting
19	65124	4	Crank Shaft Bushing
20	65125	2	Link Bushing
21	65126	2	Spacer
22	992285-MH-6-6	2	Male Disconnect
23	46053	2	Pipe Nipple
24	65135	1	Safety Latch
25	65136	1	Safety Bolt
26	65140	1	Pneumatic Cylinder
	65140H	1	Hydraulic Cylinder
	992308-4-6	2	1/4" MNPT x 3/8" FNPT Adapter for Hydraulic Cylinder
27	992107-15	1	Jam Nut
28	65116	4	Bolt
29	992089-13	4	Nut
30	65601	4	Retainer Pin
31	992012-44	4	Cotter Pin
32	992051-10	4	Lock Washer

Item	Part Number	Qty.	Parts Description
	Slip Bodies and Insert Sets		
	65622-100	1	1.315 to 3-1/2" Slip Body Assembly
	65652-1.315	1	1.315" Slip Insert Set
	65652-1.660	1	1.660" Slip Insert Set
	65652-1.900	1	1.900" Slip Insert Set
	65652-2.060	1	2.060" Slip Insert Set
	65652-1	1	2-3/8" Slip Insert Set
	65652-2	1	2-7/8" Slip Insert Set
33	65652-3.125	1	3-1/8" Slip Insert Set
	65652-3	1	3-1/2" Slip Insert Set
	65623-100	1	3-1/2" to 4-1/2" Slip Body Assembly
	65653-1	1	3-1/2" Slip Insert Set
	65653-2	1	4" Slip Insert Set
	65653-3	1	4-1/2" Slip Insert Set
	65624-4.75	1	4-3/4" Solid Slip Body Assembly
	65624-1	1	5" Solid Slip Body Assembly
	65624-2	1	5-1/2" Solid Slip Body Assembly
	Pneumatic Cylinder Repair		
34	65141	1	Barrel
35	65142	1	Piston Rod
36	65143	1	End Seal
37	65150	1	Cylinder End Cap
38	65151	1	Piston Head
39	992116-13	1	Piston Lock Nut
40	992154-014	1	O-ring
41	992154-210	1	O-ring
42	992154-228	2	O-ring
43	992154-330	1	O-ring
44	992253-250	2	Internal Retainer Ring
	65140K	1	Pneumatic Cylinder Repair Kit w/ O-rings and Internal Retainer Rings
	Hydraulic Cylinder Repair		
	65140H	1	Hydraulic Cylinder (Not field repairable)
	Optional Parts		
	65200-100	1	Pneumatic Foot Control Valve Assembly
	65200H-100	1	Hydraulic Foot Control Valve Assembly
	65220-200	1	Pneumatic Hand Control Valve Assembly
	992311	1	Filter/Regulator/Lubricator Assembly with Gauge
	65300	1	Set of Pneumatic Hoses (Three 180" with QDs)
	65300H	1	Set of Hydraulic Hoses (Four 180" with QDs)
	992285-FH-6-6	6	Quick Disconnect (QD), Female

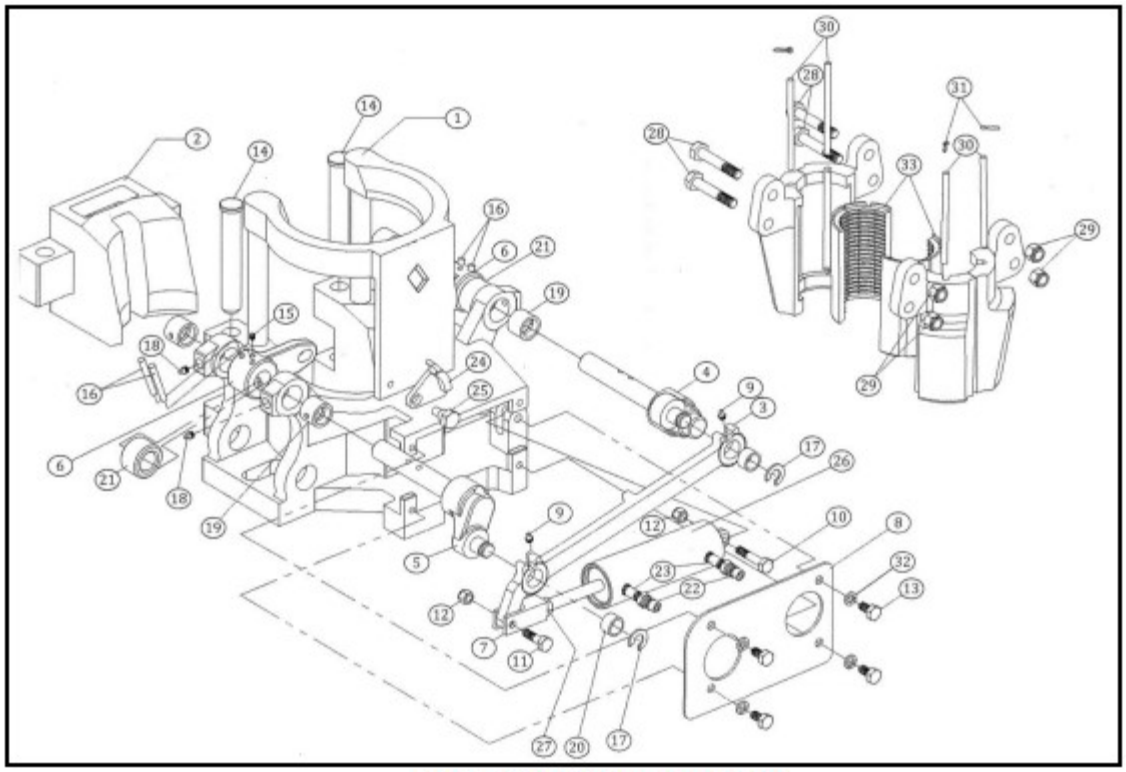

Figure 1: Tubing Spider Parts

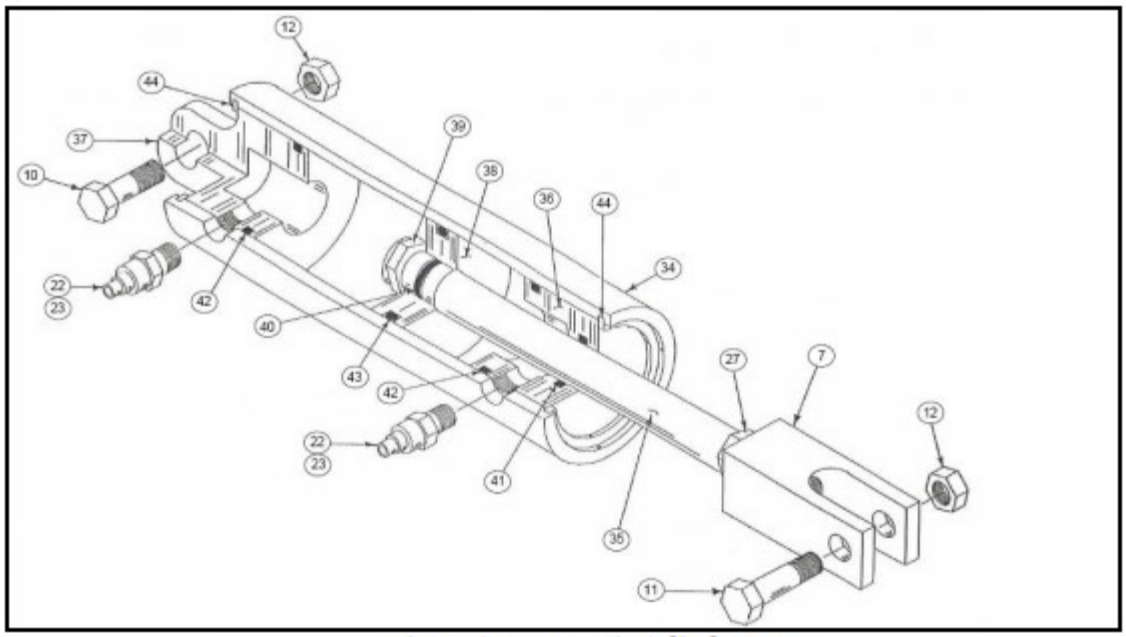

Figure 2: Pneumatic Cylinder Parts

Every Company has to have a Toolbox.

At Texas International Oilfield Tools,

We provide the tools to fuel the World!